REMARKS

Summary of Office Action

Claims 1-17 are pending.

Claims 1-17 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Sanderford et al. U.S. Patent Nos. 5,917,449 ("Sanderford") and under 35 U.S.C. § 102(e) as anticipated by Stilp U.S. Patent No. 6,184,829 ("Stilp"). Claims 7-9 have been additionally rejected under 35 U.S.C. § 102(b) as anticipated by Heller U.S. Patent No. 5,119,104 ("Heller").

Applicants' Reply.

Applicants' respectfully traverse the prior art rejection.

Applicants' invention relates to methods and system for accurately locating a mobile wireless communication device (e.g., a laptops, pager, or PDA, etc.), which is in radio communication with a wireless network (e.g., a WAN). The methods and system involve comparison of the arrival times of a reference data packet broadcast by the mobile device at two receiving station and hyperbolic trilateration to geographically locate the mobile device (See e.g., claim 7). The internal clocks of the pair of the receiving stations are synchronized for this purpose. Linear polynomial fitting of timing data of a radio beacon from a know geometrical location is used for clock synchronization (See e.g., claims 1, 7, 11, and 14).

Applicants respectfully submit that these claim elements are not shown in the citied prior art — Sanderford, Stilp and Heller.

Sanderford relates to "computation and control techniques which use historic information . . .in order to enhance the accuracy of radio position fix of an unknown radio transmitter" 103. (See Sanderford, Abstract and FIG. 1). Sanderford uses techniques for

receiver array synchronization by using "a time reference" or 'a reference timing signal" to reset or adjust clocks at receivers 102. Sanderford prescribes using a complex correction matrix to correct errors caused by multipath delays and delays caused by structural obstructions in the path of radio signals. (See e.g., Sanderford, col. 15-17). Individual receiver clocks are reset, synchronized or adjusted for drift by direct comparison to a reference clock signal using counters (See e.g., FIGS. 8, and 11). The reference clock signals are periodic clock signals (See e.g., FIG. 12) or grid synchronization signals (See e.g., FIG. 13)

Sanderford, unlike applicants, does not show, teach or suggest, directly taking a time difference (TD) in the arrival of a fixed location radio beacon at two receiver stations, and using that TD directly to synchronize the two receiver station clocks relative to each other. Further, Sanderford does not show, teach or suggest using the direct radio beacon TD in linear polynomial fit to synchronize the arrival times of radio signals from a mobile device (MDRS), or using the synchronized MDRS arrival times in a hyperbolic trilateration to compute the location of the mobile device.

Stilp is concerned with methods and apparatus for calibrating a wireless location system to make highly accurate Time Delay of Arrival (TDOA or FDOA) measurements. Stilp discloses an internal calibration method in which measured mobile device TDOA values are compared with theoretical TDOA values associated with fixed transmitted locations. Stilp's calibration method is complex and involves "injecting a comb signal into the first receiver system; utilizing the comb signal to obtain an estimate of the manner in which the transfer function varies across the bandwidth of the first receiver system; and utilizing the estimate to mitigate the effects of the variation of the first transfer function on the time measurements made by the first receiver system" (See e.g., Abstract). Like Sanderford, Stilp relies on an

external time reference signal to set, adjust, or commonly synchronize individual receiver clocks. (See e.g., col. 9 line 60- col. 10 line 19).

Like Sanderford, Stilp does not show, teach or suggest, directly taking a time difference (TD) in the arrival of a fixed location radio beacon at two receiver stations, and using that TD directly to synchronize the two receiver station clocks relative to each other or using the direct radio beacon TD in linear polynomial fit to synchronize the arrival times of radio signals from a mobile device (MDRS), or using the synchronized MDRS arrival times in a hyperbolic trilateration to compute the location of the mobile device.

Therefore, claims 1-17 are patentable over both Sanderford and Stilp.

The last cited reference, Heller, as noted by the Examiner, concerns a radio-location system for tracking for tracking objects in multipath environments such as semiconductor fabrication or manufacturing facility. Heller describes using radio tag IDs to locate tagged objects in the manufacturing facility. As noted by the Examiner, Heller, uses a reference processor clock signal to synchronize to correct the time of arrival of a radio signal transmitted by an object at an individual receiver. The portions of Heller cited by the Examiner (e.g., col. 7, line 43-52) refer to "system wide clock synchronization". Heller makes a design choice of a 200 MHZ clock, which can be up-converted to 800 MHZ at each receiver, as the system wide clock. Heller's calibration procedures (cols. 10-11) involve correction for temperature and humidity in the manufacturing facility. For this Heller uses at least three calibration transmitters (see col. 11 lines 10-12), and further corrects TOA measurements at each receiver one by one (see col. 11 lines 44-49).

Like Sanderford and Stilp, Heller does not show, teach or suggest, taking a direct time difference (TD) in the arrival of a fixed location radio beacon at two receiver stations, and

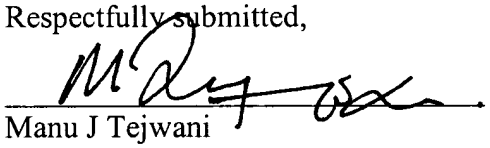
using that TD directly to synchronize the two receiver station clocks relative to each other, or using the direct radio beacon TD in linear polynomial fit to synchronize the arrival times of radio signals from a mobile device (MDRS), or using the synchronized MDRS arrival times in a hyperbolic trilateration to compute the location of the mobile device.

Therefore, claims 7-9 are patentable over Heller, Sanderford and Stilp.

Conclusion

This application is now in condition for allowance. Reconsideration and prompt allowance of which are requested. If there are any remaining issues to be resolved, applicants respectfully request the Examiner to kindly contact the undersigned attorney by telephone for an interview.

Respectfully submitted,



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